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Lespedeza

CULTURE AND
UTILIZATION

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THE COMMON LESPEDEZA has been grown to a limited extent for hay and pasturage and soil improvement in some of the Southern States for many years. The introduction of Korean and sericea lespedeza and the development of larger growing varieties of common and early maturing strains of Korean have increased the use of the crop in localities where it was already grown and have extended the lespedeza area to other States to the north and west.

Lespedeza will grow on soils of low fertility, but on the poorer soils fertilizer, particularly phosphate, is beneficial. Lespedeza is adapted to soils of relatively high acidity, but on the more acid soils lime will increase the growth materially. The seed is usually sown from February to March on top of the ground, much as red clover is sown. It is not necessary to cover the seed when it is sown on freshly prepared land. Fall-sown grain should be lightly harrowed either before or after the lespedeza seed is sown in it.

Hay made from lespedeza is equal to that made from most other legumes for feeding farm animals. Lespedeza provides pasturage during the summer and fall, when many pasture grasses are more or less dormant.

Both the annual and perennial varieties of lespedeza serve well for erosion control in gullies, on road banks, and similar areas, and in cultivated fields. Lespedeza fits readily into most of the well-established cropping systems and can usually be included with little or no rearrangement of the other crops. The annual varieties seeded early in spring will produce a crop of hay or seed the same year, and usually the shattered seed will come up and produce a crop the following year.

On some run-down soils yields of corn, cotton, and small grains have been more than doubled after lespedeza has occupied the land for 1 to 3 years.

This bulletin supersedes Leaflet 100, Lespedeza, and Farmers' Bulletin 1724, Farm Practice with Lespedeza.

LESPEDEZA CULTURE AND UTILIZATION¹

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LESPEDEZA in recent years has become a crop of major importance in the eastern half of the United States. In the western half it is not so well adapted. The estimated acreage harvested for hay in 1944 was nearly 6 million acres, and the estimated acreage harvested for seed was nearly 1.3 million. Aside from the annually planted acreage, lespedeza occurs as a volunteer crop that has spread more or less naturally over millions of acres of pasture.

KINDS AND VARIETIES

Although there are a large number of species of *Lespedeza*, some of which are native, only three are of interest to the American farmer—two annual species, *L. striata* and *L. stipulacea*, called common and Korean, respectively, and a perennial species, *L. cuneata*, known by the common name, sericea.² All three are of Asiatic origin. While these annual species are more or less similar, they can be readily distinguished. Korean lespedeza is a larger, coarser, and earlier maturing plant than common lespedeza and has broader leaflets and larger bracts or stipules at the base of the leaves. At maturity the leaves of the Korean turn forward so that the tips of the branches resemble small cones, but the leaves of common lespedeza do not turn forward. Another distinguishing characteristic is that the hairs on the stems of Korean lespedeza are appressed upward, whereas those of common lespedeza are appressed downward. From each of these species agronomic varieties that are in commercial use have been selected.

Two selections from common lespedeza, known as Kobe and Tennessee 76, are distinguished chiefly by the size of the plant. Tennessee

¹ This bulletin is a joint contribution from the Bureaus of Agricultural Economics and of Plant Industry, Soils, and Agricultural Engineering, and the Soil Conservation Service. It incorporates with more recent material some of that contained in Farmers' Bulletin 1724, Farm Practice with Lespedeza, and Leaflet 100, Lespedeza.

² In accordance with the international rules of botanical nomenclature the name *L. cuneata* has superseded *L. sericea*.

76 has a more erect habit of growth than the other annual lespedezas and produces a large growth. Kobe plants are larger and coarser than those of the common lespedeza, the leaflets are broader and longer, and the seed is larger. Kobe usually matures a little earlier than Tennessee 76.

Selected varieties of Korean lespedeza are Harbin, Late Korean, Early Korean, and Climax. Sometimes these selections are known by the numbers used with them in the process of selection. Number 19604 is Early Korean, 65280 Harbin, 19601 Late Korean, and 31249 Climax. Harbin lespedeza is very early maturing and makes small growth. Early Korean matures in midseason and makes medium growth. Late Korean and Climax are later maturing and give larger yields of hay than the other Korean lespedezas.

Although the perennial sericea is somewhat variable, selected and named varieties have not come into commercial use. (See cover.) Sericea lespedeza has been distributed under three numbers—12087, 17291, and 04730. Of these, 12087 and 17291 are of identical origin, though some observers claim that the latter is somewhat finer stemmed. No. 04730 is a week or 10 days earlier in maturing seed and grows a few inches taller than the other numbers. The height varies so greatly with soil and moisture conditions, however, that it is impossible to tell from the growth of the plants in any one field which number is being grown. For hay all probably have equal value.

The annual lespedeza varieties are all low-growing plants with relatively small three-parted leaves and bluish or purplish flowers. In thin stands they are rather spreading but in thick stands more erect. Tennessee 76 tends to be more erect than the other annual varieties. Sericea lespedeza, the perennial form, is a tall, erect plant with a growth habit somewhat like alfalfa.

All varieties of lespedeza are very leafy, having a higher percentage of leaf than alfalfa, and produce an abundance of seed. In common lespedeza and its varieties seed shatters easily, but in Korean and its varieties and in sericea there is much less shattering.

ADAPTATION OF VARIETIES

The natural range of native lespedeza species in the United States is roughly from the Great Plains to the Atlantic seaboard. The commercial species cover much this same area. The northern limit of common lespedeza follows an irregular line from southern Iowa through central Illinois, Indiana, and Ohio to southern Pennsylvania and New Jersey. To the west it is established in eastern Kansas, Oklahoma, and Texas. The varieties Kobe and Tennessee 76 are useful from Kentucky to the Gulf of Mexico. Korean lespedeza can maintain itself somewhat farther north than common lespedeza, and the Harbin variety has reseeded at Ottawa, Canada, and in Vermont. In the northern limit of its range common lespedeza is a low-growing pasture plant only, whereas Korean has made good hay crops as far north as central Illinois and Indiana. Korean is too early in maturing to be useful south of northern Mississippi, Alabama, and Georgia. It may be possible to use late-maturing varieties, such as Climax.

Sericea lespedeza is best adapted to the middle latitudes of the eastern United States but has survived winters in Michigan. In southern Georgia and in Florida fairly good growth has been made, but it is not so satisfactory there as farther north.

CHEMICAL COMPOSITION

The protein content of annual lespedeza hay, which is usually cut just before or when in first bloom, varies from about 10 to 15 percent, depending largely upon the fertility of the soil. In *sericea* the range is about the same as in the annuals, but with this species the time of cutting may vary, and this, as well as the quality of the soil, influences the protein content. Growing it on fertile soil and cutting it at an early stage of growth give a high protein content. Lime and phosphate content are slightly lower in lespedeza than in alfalfa. An application of lime and phosphate to poor soil will increase the mineral content of lespedeza grown on such soil. Tannin in lespedeza varies with the species and age. Young plants have less tannin than more mature plants, and *sericea* has much more than the annual species. The percentage of tannin in *sericea*, according to analyses made by the Bureau of Agricultural and Industrial Chemistry, varies from 5.1 to 8 percent for the whole plant and in the leaves from 7.5 to 18 percent.

COLD RESISTANCE

Lepedezas are summer-growing plants and are sensitive to cold. The annual species germinate early in spring, and although the seedlings like cool weather for their early development they cannot survive heavy frosts and are often killed by late frosts in the spring after they have made considerable growth. *Sericea lespedeza* is winter hardy and survives temperatures much below zero. The stems are killed by ordinary heavy frosts, but the crown and roots survive.

LONGEVITY OF SEED

Seed of lespedeza of all varieties deteriorates rapidly. Under average conditions seed 3 years old will germinate only about 50 percent, and seed 4 years or more old will germinate proportionately less. Seed 2 years old may give fairly good germination, but this is dependent upon its having been kept under good storage conditions. It is advisable to use seed that is not more than 1 or at most 2 years old and to have a germination test of this before purchasing or planting. Scarified seed deteriorates more rapidly than unscarified seed.

HARD SEED

The annual lespedezas have little or no hard seed and need no scarifying. *Sericea* has a high percentage of hard seed and must be scarified to insure prompt germination. Scarifying is accomplished by scratching the seed coat with any kind of an abrasive. Unscarified seed planted late in fall or in winter will become scarified by the

action of the weather, and in some areas seeding in this way is practiced.

INOCULATION

In the region where lespedeza is commonly grown inoculation generally is not needed. On badly eroded soils it may be beneficial or necessary. On land that has not previously grown lespedeza, nodulation will be increased the first year by artificial inoculation. Artificial inoculation has been found more helpful in planting north of the Ohio River than farther south.

SOIL AND FERTILIZER REQUIREMENTS

Lespedeza will grow on almost any type of soil. It does well on the sandy loam soils of the Coastal Plain, the clays of the Piedmont, and the limestone soils of Virginia, Tennessee, and Kentucky, and will grow on soils too sour to grow clover without the use of lime. Like most other farm crops, lespedeza does better on good land and makes its best growth on fertile, moist bottom land, where yields of 2 to 3 tons of hay per acre are not uncommon. On very sour land lime has proved very beneficial to lespedeza. Where soils are poor, lespedeza will respond to both lime and fertilizers. Phosphate in particular has caused increased yields and should be used generally on all the poorer soil of the Coastal Plain and upper South. From 200 to 400 pounds per acre is recommended. The amount of fertilizer that should be used depends to some extent on the amount of fertilizer that is applied to the crop preceding the lespedeza in the rotation. Korean lespedeza and its varieties are more responsive to lime than common lespedeza. Although lespedezas are fairly drought-resistant, and sericea decidedly so, good yields are dependent on adequate moisture supply.

TIME AND RATE OF SEEDING

In North Carolina, Tennessee, and farther south, annual lespedezas should be seeded in late February or the first half of March. Farther north seeding should be delayed until late March or early April. North of the Ohio River seeding in late April or early May is advised.

Sericea should be seeded a little later than the annual lespedezas and after danger of frost is past. Good stands can usually be obtained by seeding at the time early corn is planted. In the lower South stands are more certain at this time than later, when drought periods may kill the young seedlings before they are well established. Farther north, later planting will give good stands. In the latitude of Washington, D. C., good stands have been secured by planting as late as July. In Missouri good stands of sericea have been obtained by seeding unhulled seed in winter.

Korean and common lespedeza and Tennessee 76 should be seeded at the rate of 25 to 30 pounds of seed per acre; Kobe at the rate of 30 to 40 pounds; and sericea at the rate of 20 to 30 pounds of scarified seed or 50 pounds of unhulled seed per acre.

METHOD OF SEEDING

The seed of the annual lespedezas should be sown broadcast or drilled alone or on winter grain. If broadcast seeding is done too late or if the ground is too hard for freezing and thawing to work the seed under the surface, the field should be lightly harrowed after seeding. Freshly prepared land or a loose seedbed should be rolled or otherwise firmed. A firm seedbed is essential in obtaining a good stand. When annual lespedeza is seeded on meadows or pastures a spring-tooth harrow or disk should be used to loosen the surface soil before the seed is sown. This will do much to insure a stand. Sericea should be seeded alone in the Gulf States. Farther north it may be seeded on winter grain. Seeding it alone on a firm seedbed is usually to be advised.

CUTTING FOR HAY

To make the best hay the annual lespedezas should be cut when in first bloom or just before. In the latitude of North Carolina this will

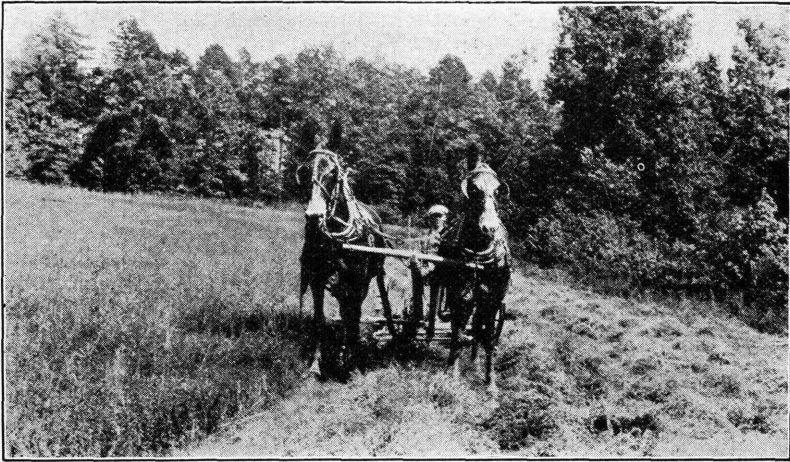


FIGURE 1.—Cutting Korean lespedeza early for hay. It is to be followed by a lespedeza seed crop.

usually be early in August for the Korean varieties and about 2 weeks later for common lespedeza and its varieties. When lespedeza is left until a considerable part of the seed is ripe, the resulting hay is of poorer grade. Sericea lespedeza should be cut when about 12 inches high. This will insure a good quality of hay with comparatively high protein content and low tannin. Lespedeza contains less moisture than alfalfa or red clover and is consequently more quickly cured. The field-cured hay contains somewhat more dry matter than similarly cured alfalfa or clover hay. Annual lespedezas cut when no more than 10 inches high should be windrowed soon after cutting and in good weather may be hauled to the barn in 24 hours. If cut early in the

morning it can be stacked late the same day. When more than 15 inches high, the cut hay should lie in the swath longer. In the southern part of the lespedeza area a seed crop may be produced after harvesting a very early hay crop of the annual lespedezas (fig. 1).

If a volunteer stand of annual lespedeza is desired the following year, the hay must be cut early (about first bloom) and high enough for the second growth to have time to produce seed, or the cutting must be delayed until part of the seed has matured sufficiently to shatter while the hay is being cut. This latter practice, however, will result in poor-quality hay.

Sericea hay cut when 12 inches high should not be left in the swath in bright sun more than an hour. It should be windrowed and hauled to the barn the day it is cut if the weather is favorable. Rapid handling of the hay is essential to save the leaves and prevent weather damage. Depending on the fertility of the soil and length of growing season, one to four cuttings of sericea can be made each season. On very poor soil only one cutting should be made, whereas on very fertile soil as many as four cuttings are possible. Too frequent cutting weakens the plant and shortens the life of the stand.

HAY YIELDS

An average yield of hay for the annual lespedeza is about 1 ton per acre. On good soils 2 or 3 tons may be expected. Sericea yields have ranged from 1 to 4 tons per acre per season. In the South, on good lands, Tennessee 76 and Kobe have yielded more than Korean. In Kentucky and farther north Korean has yielded most. The early maturing varieties of Korean give the smallest hay yields. Mainly because of thicker stand, second-year volunteer crops of annual lespedeza usually produce larger yields of hay than do first-year seedlings. Third-year volunteer crops are more likely to be weedy and therefore not so desirable for hay.

FEEDING VALUE OF HAY

Feeding trials indicate annual lespedeza hay as nearly equal to alfalfa. Sericea has been used very little in experimental feeding trials, but general experience of farmers indicates that it is both palatable and nutritious when cut at the proper stage of maturity. Chemical analyses show that the protein and mineral content of lespedeza hay varies with the stage of maturity at which it is cut and with the fertility or composition of the soil on which it was grown. The tannin content varies with the age of the plant, as does the protein, but in reverse order, the tannin increasing as the protein decreases, so that the higher the tannin content the lower the feeding value. What effect the tannin itself has on feeding value, if any, has not been determined. It seems probable, however, that it may at least have some effect on palatability, especially in the green state.

VALUE FOR PASTURAGE

The annual lespedezas afford good grazing and can be used in both temporary and permanent pastures (fig. 2). They make their best

growth during the hot summer months and provide excellent grazing during the season when many grasses are producing little. In the latitude where Korean is ready to graze early in June, Kobe is ready about 1 week or 10 days later, and common and Tennessee 76 are slightly later than Kobe. The pasture season for the early Korean varieties extends to early fall, when the seed matures and the plants turn brown. The later maturing varieties usually stay green until frost. As lespedeza does not provide much grazing before June or July, early spring pasturage must be provided by the grasses or a small grain must be grown for that purpose.

Rye or winter barley or other cereal sown early in fall will provide early spring grazing, and by the time the grain is eaten down the lespedeza is usually large enough to carry the animals through the season. Such pastures can be renewed by disking the land in the fall



FIGURE 2.—Korean lespedeza being grazed by dairy cows.

after the lespedeza seed has matured and again drilling in the small grain, allowing the lespedeza to volunteer. The use of lespedeza in connection with grain and livestock makes possible a diversified farming that is proving successful from the standpoint of soil conservation and crop and livestock production. In the region to which it is adapted annual lespedeza should be included in any grass-legume mixture for permanent pasture. When sown on established permanent pastures it will become established in thin or bare spots, thus affording excellent summer grazing.

The annual lespedezas can be maintained well with grasses that do not form a dense sod. Grasses that make a heavy, matted growth like carpet grass and Bermuda grass crowd out the lespedeza almost completely in the second season. Bermuda grass, however, offers less competition than does the carpet grass. Such pastures usually must be plowed or otherwise broken up every third year if lespedeza

is to be maintained. The use of phosphate with a lespedeza-grass mixture will help maintain the lespedeza in the stand. In a perennial grass pasture close grazing in spring is advised in order to assist the young lespedeza plants to become well established. Common lespedeza will survive longer in grass pastures than the improved varieties.

When annual lespedeza is seeded with a grain crop and the grain harvested for seed, the lespedeza, which grows rapidly after the grain harvest, can be used as summer pasture to supplement the regular pasture during the summer period of short growth. By this method overgrazing of permanent pastures can be avoided. Since the seed and leaves of Korean lespedeza remain on the plant well into the winter, late grazing is provided by this variety, as livestock readily eat the dried leaves and seed.

Sericea lespedeza has not been so universally liked for grazing as the annual varieties. In pure stand it has not always given satisfactory results when used as a pasture for beef cattle. Some livestock refuse to eat it, but many of them eat it readily. The favorable results with *sericea* might seem to indicate that with more experience it can be more widely used.

VALUE FOR WILDLIFE

The seed of lespedeza furnishes an abundance of feed for birds, and the annual species are grazed by deer and other wild animals. *Sericea*, in particular, affords cover as well as feed and serves well for both purposes. As a honey plant, annual lespedeza has little value.

HARVESTING FOR SEED

Lespedeza is harvested for seed throughout the area in which it is grown. Depending upon latitude, common, Kobe, Tennessee 76, and late-maturing varieties of Korean mature from October to November;

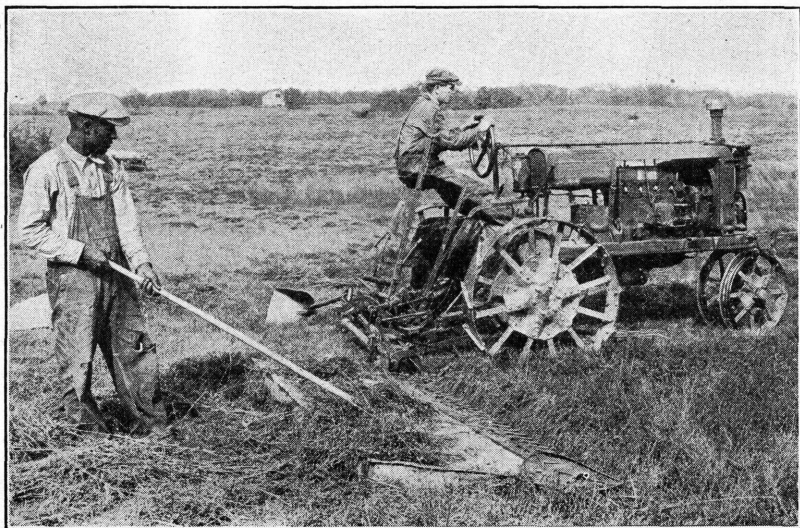


FIGURE 3.—Harvesting lespedeza seed with a pan.

early-maturing varieties of Korean from September to October; and sericea from the first to the last of October. The seed of common, Kobe, and Tennessee 76 should be harvested just before or immediately after the first frost. Seed of Korean and its varieties does not shatter readily and may be harvested any time after maturity. Unless severe storms occur it will hold its seed well into the winter. Sericea should be harvested when most of the pods have turned brown. The seed of common, Kobe, and Tennessee 76 lespedeza is harvested with a mower with a shallow metal seed pan attached to the rear of the cutter bar (fig. 3). The pan is 6 to 8 inches high at the back with sides sloping toward the cutter bar. A hinged cover for the pan is made of metal perforated with holes just large enough for the lespedeza seed to fall through. When the ripe lespedeza is cut, a man or boy walking behind the pan rakes the material over the perforated cover, thus dislodging the ripe seed. Only the best seed is caught in the pan. If more seed is desired than is obtained in this way the hay may be threshed. The use of a pan is profitable with the Korean only when the seed is high in price or when the crop is over-ripe. The seed of Korean does not shatter so readily as that of common lespedeza and therefore ordinarily is harvested with a combine or is cut with a mower, without a seed pan, then windrowed, and threshed with a pick-up combine or an ordinary thresher. To avoid harvesting too much immature seed, cutting should be delayed until the plants are brown and, except when combining direct, should be done when the plants are wet with dew. The cut material should be windrowed in the late afternoon, when it is again somewhat damp. This variety, when cut with a combine, should be dry at the time of harvesting.

SEED YIELDS

The usual range of seed yields of the common, Kobe, and Tennessee 76 varieties of lespedeza is from 100 to 250 pounds per acre. Korean yields more than these varieties and averages about 300 pounds. Sericea yields even more than Korean and averages about 400 pounds. Yields as high as 1,200 pounds have been obtained with Korean and sericea, but such high yields of common lespedeza are not obtained, on account of shattering.

CLEANING SEED

Seed as it comes from the thresher is not sufficiently clean for marketing and must be recleaned with special seed-cleaning machinery at some local mill.

USE FOR SOIL CONSERVATION AND IMPROVEMENT

Because lespedeza grows in thick stands, it affords throughout the growing season an excellent cover for the prevention of erosion. When grown alone or with a grain crop, it affords protection from eroding rains from summer to early fall and by adding nitrogen and organic matter increases soil fertility (fig. 4). If it is allowed to remain on the land without being cut, maximum benefit to soil fertility is obtained, but even when the crop is harvested for hay or

seed or is used as pasturage it gives favorable returns in increased yields. When a full growth of lespedeza is worked into the soil it greatly increases the yield of the following crop and influences the yield of succeeding crops for several years. This use of lespedeza for increasing soil fertility is one that should be emphasized and is a practice that is strongly recommended.

Loss from erosion and decline in productivity of soils are greater in the southeastern part of the United States than elsewhere. It is in this area that the lespedezas are especially useful. The annual lespedezas grow slowly in the spring, but during the summer they cover and protect the soil, and the stubble and debris go far to prevent erosion during the winter. However, unless a winter-growing crop follows the lespedeza there will be loss of plant food by leaching that should be prevented. For soil improvement and erosion control lespedeza may be fitted into the farm program in various ways.



FIGURE 4.—Corn grown after lespedeza produced 46 bushels per acre (right), as compared with 25 bushels per acre (left) when corn was grown in the same field on land on which no lespedeza had been grown—an increase of 21 bushels per acre, or 84 percent, due to the previous growing of lespedeza.

Seeding annual lespedezas on small-grain strips that alternate with corn or cotton will prevent excessive soil wash. The small grain protects the soil during the winter, the lespedeza during the summer. The strips should be moved every 2 or 3 years.

Sericea is well suited for planting on areas where permanent or buffer strips are needed; also, on critical slopes above the flow line of a terrace sericea helps to catch silt and keeps the terrace flow line open. The annuals are also sometimes used for this purpose.

Rolling fields may be kept in annual lespedeza for several years. The lespedeza can be used for hay, grazing, or seed. A winter-growing grass should be seeded in mixture with the lespedeza or a winter grain seeded following the lespedeza crop to insure against leaching and to prevent erosion when the crop is cut or grazed very close. In continuous cropping to lespedeza there is particularly a reduction of phosphorus in the soil, and the addition of this element as a fertilizer

is necessary to insure good yields. After 2 or 3 years the lespedeza field will have a higher productivity and may then be used for cultivated crops. Under a cover of lespedeza little soil loss will occur. Sericea may also be used in this way but should be left on the field 5 to 10 years.

The annual lespedezas fit well into 1-year grain-lespedeza rotations. After the lespedeza has been grazed or cut for seed the field should be well disked and sown to winter grain with a drill. When handled in this way the lespedeza will volunteer from year to year, thus checking erosion. Korean is best adapted to this rotation. If desired, the rotation may be extended to 2 or 3 or more years.

If spring oats is alternated with lespedeza, the later maturing varieties of annual lespedezas may be used. Late in winter the old lespedeza debris should be disked and an early variety of oats drilled in. When once established, the lespedeza volunteers each year.

In many sections an established field of sericea may be disked in the fall and sown to grain with a drill. As the grain and sericea make their growth at the same time in the spring, an excellent hay is obtained by combining them.

When cultivated crops must be raised, they should be grown in rotation with erosion-resisting crops. The annual lespedezas are admirable for this purpose. For example, corn can be followed by oats with lespedeza in the oats. In the fall the lespedeza should be disked and the land sown to wheat. The lespedeza is then allowed to volunteer the next season. Where crimson clover does well as a winter crop, it may be drilled in the disked lespedeza and the winter growth turned under in the spring for corn. Where crimson clover is not successful, hairy vetch or Austrian Winter peas may be used. Other rotations with corn or cotton may be arranged, as the annual lespedeza fits in more readily than any other legume.

A winter annual grass such as Italian ryegrass or rescue grass fits in well with lespedeza. These grasses grow in winter and protect the soil. In the spring they give way to annual lespedeza, and some of them will produce seed for a volunteer crop the following winter. This makes an excellent grazing and soil-protecting combination.

Small gullies can be healed and further erosion checked by seeding the annual lespedezas or sericea. Road banks and shoulders can be covered and held by lespedeza, which not only offers a good appearance but prevents washing. Grass in combination with the lespedeza can often be used to advantage.

The fact that sericea lasts for many years makes it especially useful in depressions for water outlets. Here it prevents cutting and desilts muddy water. The annuals also can be used in water-outlet meadows in combination with grass.

When a summer crop is needed for the addition of organic matter and soil improvement in orchards, the annual lespedezas can often be used advantageously for this purpose.

CROPPING SYSTEMS

A great many of the cropping systems in use in Virginia, North Carolina, Tennessee, Kentucky, and Missouri include one of the small grains. In cropping systems that include a small grain, lespedeza

nearly always follows the small grain and precedes an intertilled crop, as cotton or corn. In cropping systems that do not include a small grain, lespedeza follows an intertilled crop and occupies the land 1 or 2 years, during which time it may be cut for hay or seed. Early Korean varieties mature seed in time to permit a fall-sown crop to be planted the same year. A fall-sown crop can also follow late-maturing varieties when they are cut for hay.

A field can be seeded to lespedeza in the spring, and a crop of hay or seed can be harvested the same year. The land can then be turned for the next crop, or the lespedeza can be allowed to volunteer for hay or seed the second year. The place that lespedeza occupies in the cropping system and the use made of the crop vary with the type of farming. The cotton grower located on a sandy loam soil usually employs a slightly different cropping system from that employed by the cotton grower on a clay soil. Both systems may be different from those in use on grain and livestock farms.

Few, if any, changes in the crop sequence need be made when lespedeza is added to the cropping system. In many rotations lespedeza either takes the place of grass and clover or is grown with them. Where the soil and climatic conditions are unfavorable for the production of clover and grass, but favorable to lespedeza, it can be grown to supply the nitrogen and organic matter necessary to maintain soil fertility and round out the rotation. In a few cases a small grain—usually oats—has been added to the cropping system, as a crop of oats and a crop of lespedeza can be grown on the land the same year without an extra plowing.

The rotations outlined below show how lespedeza fits in with some of the other crops usually grown in the area under discussion. Most of these rotations can be improved by the addition of a winter cover crop to increase soil fertility and decrease erosion and leaching. The use of a winter cover crop whenever possible is to be recommended. In most cases it can be added without otherwise altering the rotation.

The following 3-year rotation is used on farms on which cotton is an important crop and on which wheat does not yield well:

- First year, cotton or corn.
- Second year, oats, seeded to lespedeza.
- Third year, volunteer lespedeza.

The acreage of oats in this rotation is the same as the combined acreage of cotton and corn, as oats follows both these crops.

The second year of this rotation provides a crop of oats for hay or grain and a crop of lespedeza hay or seed. The lespedeza can be left to volunteer for the third year of the rotation, or the land can be turned for the next crop. The usual practice is to let the lespedeza volunteer 1 or 2 years. Where cotton is grown only on certain fields of the farm because of the difference in soil conditions, two rotations are used—one for cotton and another for corn.

Where the soil is sufficiently uniform and adapted to the production of wheat and oats as well as cotton and corn, one of the following 3-year rotations can be used:

- First year, cotton or corn.
- Second year, wheat, seeded to lespedeza.
- Third year, oats, seeded to lespedeza.
- First year, corn with soybeans between the rows.
- Second year, cotton.
- Third year, wheat or oats, seeded to lespedeza.

Each of these rotations can be lengthened by allowing the lespedeza to volunteer for 1 or more years.

Another 3-year rotation used mainly on sandy loam soils adapted to the production of peanuts as well as cotton follows:

First year, cotton.

Second year, peanuts.

Third year, small grain seeded to lespedeza.

Lupines or small grains—winter oats or rye—are seeded by hand on the peanut field just before the peanuts are dug. After the peanuts are stacked, the land is harrowed to level the surface and cover any of the seed not covered by the digging operation.

The following 4-year rotation can be used where dairying is important:

First year, cotton.

Second year, winter oats and vetch, seeded to lespedeza.

Third year, corn with soybeans between the rows.

Fourth year, wheat seeded to lespedeza.

This rotation provides hay and grain for the dairy cows and two cash crops. A legume is grown on three of the four fields each year.

On soils on which dark tobacco is usually grown and which are fairly well adapted to the production of wheat as well as tobacco, corn or tobacco is followed by wheat on which grass and clover for hay are seeded the third year of the rotation.

First year, corn or tobacco.

Second year, wheat and timothy, seeded to clover and lespedeza.

Third year, hay—timothy and clover—and lespedeza.

The clover and lespedeza produce a crop of hay after the wheat is harvested, and the following year a crop of timothy and clover can be cut early in the season, and later the same year a crop of lespedeza hay or seed can be harvested.

Tobacco growers who do not lime the land regularly and have difficulty in getting red clover to grow, either sow lespedeza alone or a mixture of redtop and lespedeza in place of timothy and clover. Most growers report an increase in yield and a better quality of tobacco when tobacco follows lespedeza.

The following 4-year rotation of corn, wheat, oats, and hay, in use on many farms where livestock is an important enterprise, has been considerably improved by the addition of lespedeza:

First year, corn with soybeans between the rows.

Second year, wheat.

Third year, oats seeded to grass and clover.

Fourth year, hay—grass and clover.

It will be observed that grass and clover does not follow the wheat, because the wheat stubble must be turned for the oats, and this does not allow sufficient time for the grass and clover to become established before the field is prepared for oats. The grass and clover following the oats may produce a light crop of hay if the season is favorable. The same rotation with lespedeza added is as follows:

First year, corn with soybeans between the rows.

Second year, wheat seeded to lespedeza.

Third year, oats seeded to grass and lespedeza.

Fourth year, hay or pasture.

With lespedeza added to the rotation, a legume is on the land each year. The lespedeza seeded on the wheat produces a crop of hay

or seed, and the grass and lespedeza seeded on the oats produces a crop of lespedeza hay or pasturage. The fourth year of the rotation a crop of grass hay and a crop of lespedeza hay or pasture are produced. The grass will provide early grazing and carry the animals until the lespedeza has made sufficient growth to carry them the remainder of the season.

Where the soil is well adapted to the production of wheat the 5-year rotation of corn, wheat 2 years, hay, and pasture has long been in use on grain and livestock farms. The following plan shows this rotation with lespedeza in place of grass and clover.

First year, corn.

Second year, wheat seeded to lespedeza.

Third year, wheat, volunteer lespedeza.

Fourth year, lespedeza.

Fifth year, lespedeza.

The corn ground is disked and harrowed in the fall before the wheat is sown. Lespedeza is sown broadcast on the wheat in March. After the wheat is harvested the lespedeza produces a crop of hay or seed, after which the stubble is disked and again seeded to wheat. The lespedeza, Korean varieties, reseeds the land, and a volunteer crop follows the second year wheat. The fourth and fifth years of the rotation also provide for volunteer lespedeza, which is used for hay, pasture, or seed. A crop of corn, two crops of wheat, and four crops of lespedeza are produced with one plowing.

WEEDS

Dodder has been the most troublesome weed in lespedeza. Where the crop is used for pasturage or hay the presence of dodder is not serious, but in a seed crop it not only reduces yields but makes the seed unmarketable or salable only at a reduced price. To keep a field free from dodder requires burning, spraying, or cutting and removal of the dodder, or otherwise completely eradicating the plant. Fields that are pastured heavily or are cut for hay have relatively less dodder. The presence of other weeds in lespedeza is objectionable as they reduce the quality of hay and pasturage, and, further, it is often difficult to separate the seed from the lespedeza seed. By planting lespedeza after a clean-cultivated crop many weeds are eliminated. The same thing is accomplished by seeding lespedeza with small grain.